

Title (en)

DETERMINING AND COMPENSATING POWER TRANSISTOR SWITCHING DELAY

Title (de)

BESTIMMUNG UND KOMPENSATION VON LEISTUNGSTRANSISTORSCHALTVERZÖGERUNG

Title (fr)

DÉTERMINATION ET COMPENSATION DE RETARD DE COMMUTATION DE TRANSISTOR DE PUISSANCE

Publication

**EP 3512083 A1 20190717 (EN)**

Application

**EP 18151393 A 20180112**

Priority

EP 18151393 A 20180112

Abstract (en)

A method and an apparatus for determining switching delay times of power semiconductor switch components in parallel connected half bridge legs in which two or more power semiconductor switches are controlled in parallel. The method comprises providing a gate control signal to gate drivers of the parallel connected power semiconductor switch components, determining collector to emitter voltages of the parallel connected power semiconductor switch components, and determining separate delay times for each of the parallel connected power semiconductor switch components based on the time instant of the gate control signal and the determined collector to emitter voltages or time derivatives of the determined collector to emitter voltages.

IPC 8 full level

**H02M 1/088** (2006.01); **H02M 7/493** (2007.01)

CPC (source: CN EP US)

**H02M 1/088** (2013.01 - CN EP US); **H02M 7/537** (2013.01 - US); **H02M 7/5387** (2013.01 - CN); **H03K 17/567** (2013.01 - US); **H02M 7/493** (2013.01 - CN EP US)

Citation (applicant)

ALVAREZ R: "Characterization of New Press-Pack IGBTs and Automated Delay Time Compensation of Parallel Connected IGBTs", DISSERTATION TECHNISCHE UNIVERSITÄT DRESDEN, 2011

Citation (search report)

- [A] DE 102004049162 A1 20060413 - SIEMENS AG [DE]
- [IA] BORTIS D ET AL: "Double-Stage Gate Drive Circuit for Parallel Connected IGBT Modules", IEEE INTERNATIONAL POWER MODULATORS AND HIGH VOLTAGE CONFERENCE, PROCEEDINGS OF THE 2008, IEEE, PISCATAWAY, NJ, USA, 27 May 2008 (2008-05-27), pages 388 - 391, XP031403946, ISBN: 978-1-4244-1534-2
- [A] BORTIS D ET AL: "Active gate control for current balancing in parallel connected IGBT modules in solid state modulators", PULSED POWER PLASMA SCIENCE CONFERENCE, 2007. PPPS 2007. IEEE, IEEE, PI, 17 June 2008 (2008-06-17), pages 1323 - 1326, XP031349762, ISBN: 978-1-4244-0913-6
- [A] ALVAREZ RODRIGO ET AL: "Sinusoidal Current Operation of Delay-Time Compensation for Parallel-Connected IGBTs", IEEE TRANSACTIONS ON INDUSTRY APPLICATIONS, IEEE SERVICE CENTER, PISCATAWAY, NJ, US, vol. 50, no. 5, 1 September 2014 (2014-09-01), pages 3485 - 3493, XP011559166, ISSN: 0093-9994, [retrieved on 20140916], DOI: 10.1109/TIA.2014.2305905

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US11888397B2

Designated contracting state (EPC)

AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

Designated extension state (EPC)

BA ME

DOCDB simple family (publication)

**EP 3512083 A1 20190717**; **EP 3512083 B1 20230823**; **EP 3512083 C0 20230823**; CN 110048584 A 20190723; CN 110048584 B 20210413; US 10985751 B2 20210420; US 2019222210 A1 20190718

DOCDB simple family (application)

**EP 18151393 A 20180112**; CN 201910016876 A 20190108; US 201916247112 A 20190114